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The Founding of Apple and the Reasons behind Its Success

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Abstract

Apple Corporation is one of the most profitable, and socially influential companies that ever existed. Its products are in homes, businesses and entertainment venues. It constantly brings out new high-tech tools to the consumer electronics market, the most recent one being the Apple Watch. The creation of this company is more humble, and is the result of a conjuncture of various factors that have converged to create a unique environment. It all started with a group of amateur electronics enthusiasts. Smart individuals, an engineering-oriented social environment, business angels willing to invest in a new start-up company, and the developments in technology appearing at the right time and place have all contributed to this creation. It took engineering knowledge, visionary management and a business outlook to succeed. Individual entrepreneurs and developing countries carefully study the reasons behind the success and influence of Apple, so that they could recreate the conditions for imitating similar successes for themselves and their countries. Especially universities are encouraged to launch start-up companies and dive into the commercial world. Techno-parks are built to imitate the achievements of garage founded companies such as Apple. In this study, the perceived and deducted reasons for Apple's success are examined using an opinion survey, and accounts of the founders are examined and conclusions are made based on this information. The results show that the perceived and true reasons for Apple's success may be very different and that a legendary image of the company with an ardent fan base may obscure the true reasons behind its success.

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Keywords: start-up, techno-park, Apple, business, entrepreneurship

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1. Introduction

This paper examines the beginnings of Apple and examines the reasons behind its success using accounts of the founders (mainly that of Steve Wozniak) and an opinion survey. In this section a brief history of Apple's beginnings up to the launch of Apple-II is presented.

1.1. A Brief History of Apple's Beginnings

Apple was not found by a single individual. However, a few people were instrumental in its initial success. In the technical context, the credit should go to Steve Wozniak. He was the genius behind the merging of the microprocessor, the motherboard and the keyboard input/monitor output interface. In the management and business aspects, Steve Jobs, along with Mike Mirkkula played key roles.

Wozniak's father was an engineer at Lockheed and he liked to explain electronics to his son (Isaacson, 2014). In June 1971, Wozniak, along with his neighbor Bill Fernandez (Linzmayer, 2004), built a computer similar to the MITS Altair they named the "Cream Soda Computer". Fernandez helped Wozniak with all kinds of things building the computer in his garage. It was the most minimum thing that could be called a computer; a little circuit board with 256 Bytes of RAM and a CPU on several chips (Wozniak, 2007). It had no keyboard or monitor, instructions were fed in by punch cards and the results were seen by flashing lights on a front panel (Isaacson, 2014). As a result of their early partnership, few people knew the workings of Wozniak's mind like Fernandez (Hiner, 2014). Fernandez, still in high school, introduced a friend of his who was also interested in electronics and practical jokes (Hiner, 2014) to Wozniak, called Steven Paul Jobs (Linzmayer, 2004). In fall 1971, Wozniak read an article in the Esquire Magazine that described how people called "phone phreaks" created a device to fool the telephone system (Isaacson, 2014). Together with Jobs, they built a device that could imitate certain tones that allowed them to make free long distance calls. These were called the "blue boxes", and Wozniak and Jobs were able to build the boxes for $40 and then Jobs would sell them door to door for $150 (Linzmayer, 2004). This experience enabled them to learn how to work together as a team, and Jobs would later remark that there would have been no Apple without the blue boxes (Isaacson, 2014). After some time in college, Jobs dropped out of it, went to a pilgrimage to India and after he returned in 1974, he started working for Nolan Kay Bushnell, who had founded Atari in 1972 (Linzmayer, 2004). His manager was Al Alcorn, who had to place Jobs on a night shift to avoid confrontation of him with other employees. Jobs later recalled that his time in Atari gave him some important lessons about keeping the interfaces friendly, intuitive and simple (Isaacson, 2014).

In those days, Atari's Pong game was a great success. It was designed all in hardware. Wozniak, knowing Jobs and his work, created a hardware where he could play Pong on his TV set (Isaacson, 2014). Bushnell now envisaged a variation of Pong called Breakout (Linzmayer, 2004). A ball would bounce off a moving platform and hit some bricks, destroying them and giving points to the player. He asked Jobs to design the game, knowing that he would enlist the help of his friend, Wozniak (Isaacson, 2014). Wozniak, skipping sleep for four days, managed to finish the game with a low number of chips.

Wozniak got a phone call from Allen Baum and that call introduced him to what would become the Homebrew Computer Club (HCC). He had already built a terminal that could access the ARPANET, the government-owned network of computers that was the predecessor to the internet. His terminal would allow him to display letters on his TV set. The only other alternative was a teletype system that cost thousands of dollars. Wozniak and Jobs had sold the ARPANET terminal to Call Computer in Mountain View (Wozniak, 2007). On a cloudy day in March 1975, a group of computer enthusiasts gathered in the garage of Gordon French. Wozniak was at the first meeting, and later Jobs joined him, carrying the TV set of his devices. The club members were focused on a product by a company called MITS (Micro Instrumentation and Telemetry Systems). Someone was holding up an issue of Popular Electronics which had the picture of a computer in front of it. It was Altair from a New Mexico company called MITS (Wozniak, 2007). It was a hobbyist kit computer; you bought the pieces and put them together yourself. Another person also started passing out data sheets for a microprocessor called the 8008 from a company in Canada

and it was a clone of Intel's 8008 processor. Now all the CPU was on one chip instead of many chips (as on the Cream Soda Computer), and it had pins coming out and all you had to do was to connect things to it like memory chips (Wozniak, 2007). Someone was selling the Altair for $379. It was designed around an Intel 8080 microprocessor. After the group grew to about a few hundred people, they moved to the auditorium of Stanford Linear Accelerator Center in Palo Alto (Linzmayer, 2004).

In the first meeting, Wozniak, who didn't know much about computers at that time, learned of a component called a microprocessor, a central processing unit on a single chip, it's the heart of any computer. Starting from 1971, microprocessors were making complex circuit boards obsolete, and Japanese electronics companies began mass-producing products cheaper than homemade ones. Before the HCC meeting, Wozniak was designing a so-called "dumb" terminal, a device that could connect to a far-away time-sharing computer, but it could use a keyboard and monitor as its input and output interfaces. Wozniak started designing a new stand-alone computer around a microprocessor that would later be known as the Apple-I (Isaacson, 2014).

Wozniak had done minicomputer redesigns, data on screen and had already done a TV terminal. He knew how to connect memory. All he needed was this Canadian microprocessor and some memory chips to have his own computer. He thought he could build an extremely small computer he could write programs on. This whole vision of a personal computer appeared in his head. Every computer up to this time looked like an airplane cockpit with switches and lights you had to manipulate and read. He realized that since you already had a keyboard, you didn't need a front panel, you could type things and see things on screen. Before Apple-I, all computers had hard-to-read front panels without screens and keyboards. After Apple-I, they all had keyboards and monitors (Wozniak, 2007). Wozniak wanted to add a new feature to his new computer. When one turned a calculator on, it was ready to go: it had a program in it that started up and then it was ready for you to hit a number. So it booted up automatically and just sat there, waiting for the user to tell it to do something. The program on a calculator that did this was on three little ROM chips that held their information even when power was turned off. He knew he could have a ROM chip that would hold a program of mine that would let the computer turn on automatically. He needed to write a small program that would run as you turned the computer on, tell the computer how to read the keyboard, let the user enter data into memory, let you see what data was in memory and make the processor run a program at a specific point in memory. He called it a "monitor" program. Two PROM (Programmable Read Only Memory) chips he found in the lab could hold 256 Bytes of data and he needed to fit his entire monitor program into these. He was good at making programs small but it was still a difficult task (Wozniak, 2007). He realized that soon a new processor called the MOS 6502 from a company in Pennsylvania would be announced at Wescon in San Fransisco. That microprocessor was fully compatible with the Motorola 6800 chip that Wozniak had designed his computer around. So he could just replace the more expensive chip with this one without any redesign. It cost half of the Motorola chip. At Wescon, from the MOS Technologies booth, he bought a few chips and a manual (Wozniak, 2007).

He built the project at his office at Hewlett Packard. It was an engineering environment and all the equipment he needed to solder and test his computer was there. As for RAM, he also had thirty-two SRAM chips each holding 1024 bits, for a total of 4K Bytes of memory, 16 times what the Altair had. Those days, DRAM was becoming more popular and less expensive and it could have 4K bits per chip instead of the 1024 bits per chip SRAMs Wozniak had been using. Around that time, someone at HCC offered some 4K-bit DRAM chips at a reasonable price. Wozniak bought eight of these chips for $5 each. He redesigned the memory connector on Apple-I so it could accept either an SRAM or DRAM board.

He showed the Apple-I at every meeting of HCC after he got it working. He copied a hundred copies of his complete design along with the monitor program and gave it to anyone who wanted it. This was a computer with only 30 chips on it. And one could use his home TV with it (Wozniak, 2007).

At first, he wanted his computer to run FORTRAN, a popular science and engineering oriented language at the time. In 1975 Bill Gates had written a BASIC interpreter for Altair. Also a book called the 101 Basic Computer

Games by DEC (Digital Equipment Corporation) came out. And there was no BASIC interpreter for the MOS 6502 processor yet. So Wozniak decided that he would use BASIC as a language for the Apple-I instead of FORTRAN. Wozniak started using some HP BASIC tables and writing what is called a syntax table, a table that defined the rules as to how components of a programming language could come together. Wozniak's BASIC interpreter only worked with integer numbers for simplicity. So the 6502 chip became "programmable" in BASIC.

Apple-I had no permanent storage. Every time the computer was turned off, the interpreter program would have to be entered again using the keyboard. The BASIC interpreter Wozniak wrote was a 4K-Byte program and it took almost 40 minutes to type it every time. So he developed a cassette tape interface, a $75 card that would fit to the sole expansion slot of the Apple-I. A regular cassette tape could hold the BASIC and when the memory was turned on it could automatically load the interpreter onto memory. However, the 6502 BASIC based on the HP BASIC was different than the Bill Gates' Microsoft BASIC based on the DEC BASIC. DEC was the the company who published the 101 Basic Computer Games, so in order to play the games in Apple-I some changes would have to be made. When these changes were made, the games could be made to work on Apple-I (Wozniak, 2007).

By this time Jobs had seen this creation of Wozniak and had helped him carry his TV to HCC meetings. Jobs was asking all kinds of questions to Wozniak, like if a disk storage unit could be added to the computer. He was asking the right questions, but at that time Wozniak didn't know how and when these things could be possible. So Jobs was the visionary in the partnership. Jobs even arranged for Wozniak to get better Intel DRAM chips by talking to an Intel sales representative. Intel chips were smaller than AMI chips Wozniak had bought from the HCC guy. One day Jobs offered Wozniak to build and sell the printed circuit boards to HCC members who already had the schematics but didn't have time to actually build them. People would get the necessary chips themselves and solder them onto the boards. Many HCC members were working for computer companies and so could have many of the chips for free. He suggested that the boards could be built for $20 and sold for $40. Wozniak figured they would need about $1000 to get a company to print the circuit boards. And even to get this much money back, they would need to sell the boards to 50 people for $40 each. To come up with this initial capital, Wozniak sold his HP 65 calculator for $500 and Jobs sold his Volkswagen van for another few hundred dollars. Jobs used to visit a communal farm up in Oregon called an "apple orchard" where they grew apples. At a time while Wozniak was driving Jobs back from the airport, Jobs suggested the name Apple Computer for their company. They asked help from a friend of Jobs' at Atari, who said he could make the initial design of the boards for $600. They needed this to give this design to the company who would actually print the circuit boards. Jobs also brought in Ron Wayne from Atari and he would be a partner of Apple at the beginning. Wayne played a big role in those early days of Apple, in the days before they had any funding, he wrote the early operation manual and designed the very first Apple Logo. Eventually they drafted a partnership agreement where Wozniak and Jobs would have 45% each, and Wayne would have 10%. Wozniak's father, thinking that his son had made all the work, was not happy to give equal shares to Jobs, but Wozniak understood Jobs' value in the partnership (Isaacson, 2014). Because Wozniak also worked at HP at the time, he tried to run his idea through the HP hierarchy and have HP build the computer, his only reward would be to work on the project. But HP turned him down, leaving him free to work on the project with his partners. They got the circuit board finished and working (Wozniak, 2007), and filed the partnership papers for Apple Computer Company on April 1st, 1976 (Linzmayer, 2004).

The owner of a small local computer chain named Paul Jay Terrell had seen Wozniak show his computer and had asked Jobs to stay in touch. Jobs went to see him the next day. They arranged for the purchase of 100 computers, fully built, for $500 each. Terrell would pay them cash on delivery. It was a huge sum of money for both of them. Terrell was starting a new computer store called the Byte Shop in Mountain View. In order to buy the parts they needed for the assembled boards, they loaned some money from Allen Baum's father, they also arranged for getting the necessary chips from Cramer Electronics on a 30 day credit. The first batch of boards were finished in January 1976. The boards cost $220 to build. They would assemble the boards, plugging in the chips at Jobs' family garage and his friend Dan Kottke and little sister Patty would help plug the chips on for $1 per board. Fernandez was also there, helping plug in the chips (Hiner, 2014). Then Wozniak would test them with a keyboard and a TV and if they worked, they were placed in white box for delivery to Terrell's shop. But the computers were not fully built as

Terrell was expecting (Linzmayer, 2004). He would have to supply monitors, transformers for the power supply, keyboards and even wooden cases to put the boards in (Wozniak, 2007).

Then Wozniak finally went in front of the whole HCC and personally presented his product. The price for the Apple-I was fixed at $666.66. They sold more than 100 units by traveling door to door to small computer stores (Wozniak, 2007). Wayne was not happy with his side of the partnership, he was used to big companies and salaries, and also the legal nature of a partnership agreement meant that he had unlimited personal liability for any debts incurred by Apple (Linzmayer, 2004), so Wozniak and Jobs bought him out for $800 (Wozniak, 2007).

In 1976, Wozniak started designing a new computer that would be called the Apple-II. He wanted to have color on the TV display, unheard of in small computers up to that day. He designed it around text and high resolution graphics. He reserved a DRAM bank to keep the data for what needed to be displayed on screen. This enabled him to lower the chip count and Apple-II had half the number of chips as Apple-I. There were faster DRAM chips available, so Apple-II was faster than Apple-I and also allowed for sound and the attachment of game paddles. It was also ready to use at boot-up, with BASIC already in the ROM. The Apple-II board was finished by August 1976 and it was flown to the PC ’76 Show in Atlantic City, although it was not publicly announced there. At the show, Wozniak managed to program the game Breakout in BASIC language and realized that all the changes he made in the game would have taken him years to do in hardware. It was much faster to do them in software and the whole gaming world would change (Wozniak, 2007).

They also hired an engineer called Rod Holt to build a switching power supply that generated less heat and could be placed inside a plastic case. This would allow for a more integrated design for the Apple-II. It would be the first computer ever with a plastic case (Wozniak, 2007). Jobs had decided that the next personal computer should not be a hobbyist kit, but an appliance, with a nice case requiring no assembly. The aim was no longer the electronics hobbyist, but regular people. It was also the start of the philosophy of controlling the customer experience from start to finish; Apple’s hardware would be tightly integrated with its operating system software (Isaacson, 2014). Holt, along with Fernandez, was also instrumental in converting Woniak’s prototype into a set of readable schematics that could be used as a standard to mass produce the computer product (Hiner, 2014).

In that same year, they started looking for funding their new computer. They showed it to Chuck Paddle from Commodore Business Machines, which produced calculators, in Jobs’ garage (Linzmayer, 2004; Wozniak, 2007). This was the person from whom Wozniak had bought the MOS 6502 microprocessor. He liked the presentation that included impressive high-resolution color spirals, and so decided to have them make another presentation to the company’s leading figures. Jobs set the price of their creation at a few hundred thousand dollars plus $36,000 a year jobs for Wozniak and himself (Linzmayer, 2004; Wozniak, 2007). But, Commodore turned them down, they had decided to build their own computer (Wozniak, 2007). It was just as good because Jobs was also getting suspicious about the deal (Linzmayer, 2004).

After the Commodore episode was closed, they turned to Al Alcorn, the co-founder of Atari. Alcorn told them that Atari was too busy working on the video game market. Later, some venture capitalists contacted by Jobs started to arrive, among whom was Don Valentine from a firm called Seqoia which had also funded Atari (Isaacson, 2014). While Valentine turned them down as well, he forwarded them to a guy called Armas Clifford “Mike” Mirkkula, Jr. who was into gadgets (Wozniak, 2007). He has retired a year earlier and had made a small fortune from his stock options in the chip makers Fairchild and Intel.

When they met with Mirkkula, Wozniak was impressed. He proposed raising $250,000 to build 1000 computers. He talked about introducing the computer to the ordinary people to do things like keeping recipes and balancing a checkbook. He had the vision of Apple-II as a real home computer. In realizing this vision, what is called a killer-app, an easy-to-use program that could be used by regular people to run their daily businesses was important. This is where Dan Bricklin and Bob Frankston’s Visicalc came into play. The computer they chose for it was Apple-II,

because Wozniak had made its architecture open and transparent so that software developers could easily access the functions necessary to run their software on it (Isaacson, 2014).

Mirkkula also predicted that they would be a Fortune 500 company in two years. He also asked Wozniak to leave his job at HP and set a deadline for him to decide. At first Wozniak said no, but after a while, thanks to pressure from Jobs, he relented and left his job at HP (Wozniak, 2007). With the money from the Apple-I sales, they moved into an office in Cupertino. Mike Scott, a former director at National Semiconductor had been hired to be the first president of Apple (Wozniak, 2007).

They decided to show Apple-II to the public for the first time in the West Coast Computer Faire (Wozniak, 2007). After that, it went on sale for $1,298 and within three years 100,000 computers were sold (Isaacson, 2014). Dubbed the "iPhone of its era, the product that redefined every machine that came after it," (Hiner, 2014). Apple-II sales continued to explode and Apple Computer Inc. was headed for a stock launch that would generate more capital than any since Ford Motor Co. and would set a new record creating over 300 millionaires (Hiner, 2014). It was the crowning success of the giant company that would be Apple.

2. Literature Review And Hypotheses

In this section the relevant literature will be examined and the hypotheses are presented.

2.1. Literature Review

The founding of Apple is a popular subject, and as a result several books have come out examining how this technological giant came about. For those who want to know the engineering aspects first hand, Steve Wozniak's iWoz is an excellent resource. For researchers who are more interested in the business and marketing aspects should definitely read Walter Isaacson's Steve Jobs: The Exclusive Biography. Walter Isaacson has also written a book called The Innovators, examining the whole history of computing from Charles Babbage's analytical engine to the latest improvements. It's a great resource for any computer history enthusiast. It also includes a section on the foundation of Apple, and compares it with other contemporary entrepreneurs such as Bill Gates. Another interesting book is by Owen W. Linzmayer called Apple Confidential 2.0. It has a very engaging language and many pictures accompanying the interesting text. Besides these books that focus on the very beginning of Apple, there are also several books written by former employees that examine what happened after the company was fully established. For a good example, see Revolution in The Valley: The Insanely Great Story of How the Mac Was Made by Andy Hertzfeld. Among these one notable book is a biography of the British designer Johnny Ive; Johnny Ive: The Genius Behind Apple's Greatest Products by Leander Kahney.

2.2. Hypotheses

This section breaks down and classifies the possible reasons for the success of Apple, with an explanation that relates the history of the company from the founders' perspective with the possible success reason examined.

- Abilities:
    - Engineering Abilities

Wozniak's father was an engineer at Lockheed, he showed his son electronic parts, made him play with them (Wozniak, 2007;Isaacson, 2014) and as a result Wozniak was brought up as an engineer from the start. He can be even considered an electronics genius who can optimize a design for the fewest number of chips, using smaller chips and least number of electrical connections. Even though Jobs had no formal engineering education, he was also

interested in electronics and gadgets, even though his vision extended beyond the technical aspects. He knew the things necessary to be able to ask the right questions to Wozniak and implement these ideas.

- Business/Management Abilities

Jobs was an entrepreneur by instinct. He had a broad and informed vision, he was good at communicating with people and he could motivate people to do things for him, so he had leadership skills. He was eager to become a businessman, and after founding Apple, he mostly wore a business suit. He knew how to hire the right people for the job.

- The Environment

- Social Environment

Apple was found in a time when the Hippie Culture was very popular among the young population of the US. They were very interested in Far Eastern cultures like those of India and Japan, and the sense of minimalism and simplicity in these cultures have effected their design philosophy.

Youth opposition to Vietnam War, and the publication of the so-called Pentagon Papers, that showed the Gulf of Tonkin incident was largely made up by the Johnson administration, had diminished belief in the elected government. People started to believe that they were stuck in an always winning system where their votes did not count. "I still think about this whole era with a lot of pain," recalled Wozniak (2007).

As a result ideas such as social justice and universal access to technology started to spread. "There was magic in the air…we were going to change the world,…society in a significant way… anything was possible,…fulfilling the growing demand and desire for people to own their own computers,…we were empowering ordinary people to do things unimaginable,…putting the latent, potential power of technology into the hands of the people," Hiner (2014) quotes Fernandez as saying. Wozniak recalls that "Homebrew had a goal: to bring computer technology within the range of the average person,…people could afford to have a computer and do things with it…computers could be owned…used by anybody, no matter who you were or how much money you made…affordable…change people's lives…a benefit to humanity…social justice…low-cost computers would empower people to do things they never could before," (Wozniak, 2007). On a micro level, the founders of the company were nerdy, "socially inept and intellectual" and "didn't have many friends," (Hiner, 2014).

O Technical Environment

Apple could not be founded without the HCC, a group of computer enthusiasts who were willing to freely share ideas and distribute their achievements. The Santa Clara Valley where the founders lived, which would later be named the Silicon Valley (Linzmayer, 2004), was home to many technical and engineering company employees. Many of them had personal workshops in their garages and they liked to chat with the neighborhood kids about the "emerging tech boom", and share tools and parts with them (Hiner, 2014).

- Economic Environment

Neither Wozniak nor Jobs were members of wealthy families. In order to fund their initial partnership, they had to sell some of their belongings. It was also a factor in making Wozniak always go for the simplest design with fewest chips. Wozniak had to build his own affordable computer in order to make his dreams come true.

- Technical Conjuncture at the time

The beginning of 1970s saw the introduction of the microprocessor, which is a CPU on a single chip. Japanese electronics factories started producing cheaper electronic components (Isaacson, 2014). As a result the number of chips required to build a personal computer decreased considerably, while the individual chip sizes also decreased. The advances in electronics also enabled Holt to design smaller power supplies which generated less heat, and finally advances in the manufacturing processes allowed for the plastic cases for Apple-II to be built.

- Business angels

Business angels, people who look for young people to start up companies and willing to invest their money in them is a key factor in the success of Apple. In this case it was Mirkkula who helped fund the company.

- Advertisement/Marketing

Unlike the contemporary image of Apple today, spending big money on advertisements and marketing, Apple the start-up company was more humble, as it needed funding barely sufficient for building the computers. This is especially true for Apple-I where the founders could not afford to invest in advertisements and commercials. Jobs' famous product introductions would begin only later with the Macintosh in 1984. So advertisement and marketing would not play a big role in the founding days of Apple.

- Schooling of Founders

Jobs never completed college while Wozniak had an intermittent college education. Their abilities and skill set was largely obtained as a result of their own personal interest in electronics rather than a formal school education. In this context, Wozniak recalls that his friend Baum would photocopy his textbooks at MIT and send them to Wozniak (Wozniak, 2007). However, in the end, formal schooling of the founders play a very little role, if any, in their success.

3. Methodology

3.1. Research Goal

In this survey the aim was to understand the opinions on Apple in general, and what the participants think about the reasons behind its success.

3.2. Sample and Data Collection

The survey used here was made online by 63 participants from various backgrounds and demographics. In order to respect the privacy of the participants, no personal data was collected. The participants have marked the importance of any given possible success reason from a scale of 1 to 5.

3.3. Analyses and Results

The same classification of possible reasons for Apple's success are examined. The results are given below in Figures 1-4. In the figures the y-axis is the number of participants that choose a given scale, and x-axis is the scale itself.

- Abilities:
    - Engineering and Business/Management Abilities

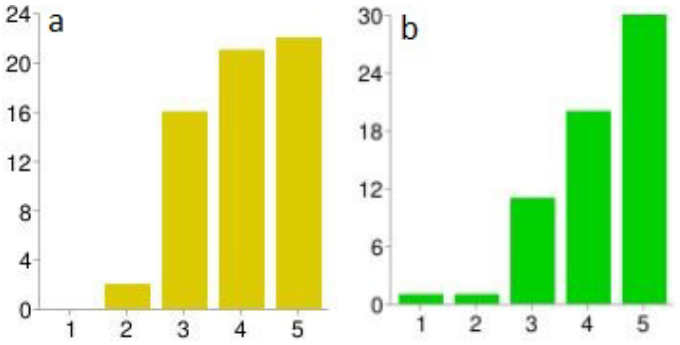

Fig. 1. Opinions of participants on the importance of engineering (a) and business/management (b) abilities of the founders in Apple's success.

- The Environment
  - Social Environment

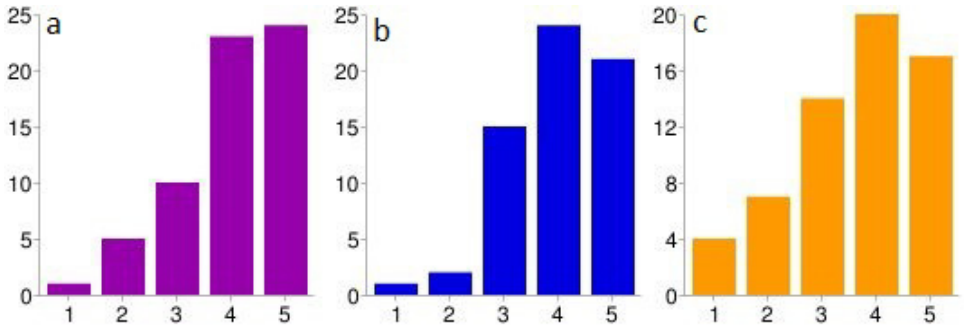

Fig. 2. Opinions of participants on the importance of the social (a), technical (b) and economic (c) environments of the founders in Apple's success.

- Technical Conjuncture, business angels and advertisement/marketing

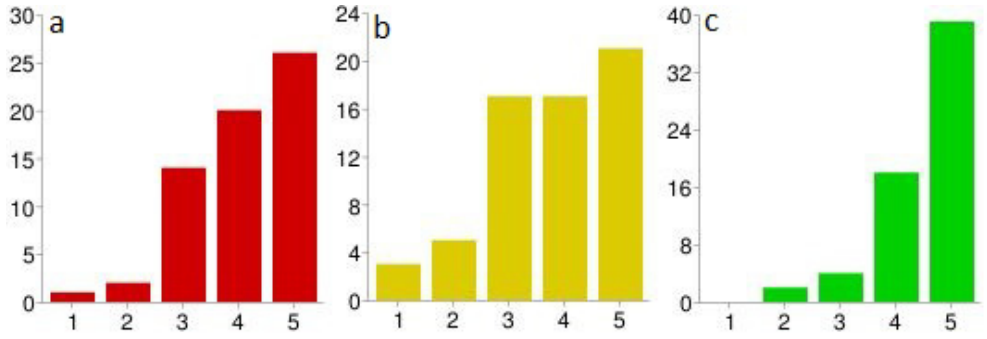

Fig. 3. Opinions of participants on the importance of the technical conjuncture (a), business angels (b) and advertisement/marketing (c) in Apple's success.

- Schooling of Founders

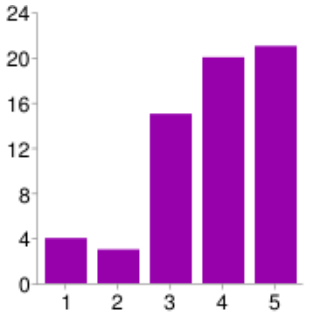

Fig. 4. Opinions of participants on the importance of the schooling of the founders in Apple's success.

4. Conclusion

The opinions of the participants mostly match the written accounts of the founders of Apple. However there are two cases where the ideas diverge. One is that many participants think advertisement/marketing play a huge role in Apple's success. We have established that, this is not the case, at least for the initial years of Apple. The second point is that many participants also think that the schooling of the founders has played a big role in the founding of Apple. This also turns out not to be the case as discussed above. The study showed that the individual engineering, business and management abilities of the founders is an important factor. It was also established that the technical, social and economic environments of the founders have played important roles in Apple's success. This has prompted many governments who wish to imitate Apple's success to build so-called techno-parks, areas where new start-up companies can be easily built and run. However the success of such places is controversial, and many believe the age for garage companies, marking a specific technical conjuncture in the history of engineering oriented business has already passed and became a vision of the past. Some others point out newly found successful start-ups. Whatever the case, there are many lessons in the technical and engineering history of Apple for those who wish to learn.

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